UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,500	01/10/2002	Tomoyuki Fujii	791_182	9278

25191 7590 06/10/2004

BURR & BROWN
PO BOX 7068
SYRACUSE, NY 13261-7068

EXAMINER	
KITOV, ZEEV	

ART UNIT	PAPER NUMBER
2836	

DATE MAILED: 06/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/044,500	FUJII ET AL.	
	Examiner	Art Unit	
	Zeev Kitov	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Examiner acknowledges a submission of the amendment and arguments filed on March 12, 2004. Applicant's arguments have been given careful consideration but they have been found not persuasive.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsunaga (US 6,256,187) in a view of Tomaru et al. (US 6,071,630). Matsunaga discloses most of the elements of Claim 1 including an electrostatic chuck having a bonded structure comprising a ceramic electrostatic chuck member (element 22 in Fig. 1, col. 4, lines 1 – 18), a metal member (element 12 in Fig. 1), and a first and second bonding layers (elements 20 and 14 in Fig. 1); the first bonding layer is being bonded to the ceramic chuck, the second bonding layer is bonded to the metal member (element 12 in Fig. 1); it further discloses a polyimide layer (element 14 in Fig. 1, col. 6, lines 3-16) being disposed between said first and second most outer bonding layers. It further discloses a structure of an adhesive sheet (Fig. 7, col. 8, lines 53 – 67, col. 9, lines 1 –

21), which includes polyimide film (element 14 in Fig. 7) sandwiched between two external layers (elements 42 in Fig. 7). These external layers include silicone resin (col. 9, lines 16 – 21). However, it does not disclose the silicone bonding layers. Tomaru et al. discloses the silicone bonding layers (elements 18 and 20 in Fig. 1 and 2, col. 2, line 66 – col. 3, line14, col. 5, lines 18 - 32). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Matsunaga solution by adding the bonding silicone layers, because of the silicon advantages, such as, according to Tomaru et al. (col. 1, lines 63 – 67), the excellent thermal conductivity and heat dissipation and ability to withstand high temperatures.

2. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsunaga in a view of Tomaru et al. and further in a view of Court Decision *In re Aller,* 105 USPQ 233. As was stated above, Matsunaga and Tomaru et al. disclose all the elements of Claim 1. Regarding Claim 2, Tomaru et al. disclose the thickness of bonding layer as being 0.1 to 30 μm (col. 6, lines15 – 17), while Applicant uses 50 – to 500 μm. There is a minor gap between two ranges. The Court Decision addresses this issue stating that discovering the optimum or workable ranges does not represent a novelty or an innovative step. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the enlarged bonding layers thickness, because as Court Decision states, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

As to Claim 4, the same considerations given above with regard to Claim 2 rejections are applicable.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsunaga in a view of Tomaru et al. and further in a view of Parkhe (US 5,909,355). As was stated above, Matsunaga and Tomaru et al. disclose all the elements of Claim 1. However, regarding Claim 3, they do not disclose a base material made of aluminum nitride and being sintered with an electrostatic chuck electrode. Parkhe discloses the electrostatic chuck having a base material made of aluminum nitride (element 206 in Fig. 3) and being sintered with an electrostatic chuck electrode (col. 3, lines 53 –67 and col. 4, lines 1 – 35). Both patents have the same problem solving area, namely design of the electrostatic chucks. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the Matsunaga system by using the aluminum nitride ceramic, which is sintered with an electrostatic chuck electrode according to Parkhe, because according to Parkhe (col. 1, lines 44 – 67, col. 2, lines 1 –13), this will resolve a problem of reduced ceramic resistivity at high temperatures.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsunaga in a view of Tomaru et al. and further in a view of McMillin et al. (US 5,835,334). As was stated above, Matsunaga and Tomaru et al. disclose all the elements of Claim 1. However, regarding Claim 4, they do not disclose a value of

flatness of an adsorption surface in the electrostatic chuck as being 30 μm or less. McMillin discloses the flatness as being of 0.001 inches, which is slightly smaller than a value of 30 μm cited in the claim. Both patents have the same problem solving area, namely design of the electrostatic chucks. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ceramic material with the flatness of 0.001 inch according to McMillin et al. in the electrostatic chuck of Matsanuga, because as McMillin states (col. 4, lines 30 – 36), the coating should be non-porous and provide an electrical voltage breakdown strength of at least 500 volts/mil. As well known in the art, reduction in a degree of a surface flatness increases the voltage breakdown value.

5. As per Claim 5, in addition to the limitations of Claim 1 it includes limitations of a device manufacturing process. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsunaga in a view of Tomaru et al. and further in a view of Weldon et al. (US 6,108,189). Weldon et al. discloses a manufacturing process of a composite dielectric member having a polyimide as one of its layers (col. 23, lines 20 – 25). The disclosed manufacturing process includes placing of multiplayer structure into a vacuum-packing bag (col. 23, lines 63 – 65) and heating the vacuum-packed dielectric member under isotropic (isostatic) pressure (col. 23,lines 65 – 67). As to sandwiching the layer between the ceramic electrostatic chuck member and the metal member, this step is inherent in the manufacturing process dues to its structure, which was addressed above. Both patents have the same problem solving area, namely design of

electrostatic chucks. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the manufacturing process according to Weldon et al. for manufacturing of the electrostatic chuck of Matsunaga, because as Weldon et al. states (col. 23, lines 40 – 46), the composite dielectric member can be manufactured by a variety of conventional methods including isostatic pressing thermal spraying, spattering, CVD, PVD, solution coating, or sintering a ceramic block with the embedded electrode. The thermal isostatic pressure is one of the methods. A selection of particular method is up to the designer according to his secondary specification requirements.

Response to Arguments

In his arguments regarding previous Office Action Applicant attempted to disqualify the references and the motivation for combining them by saying, "the sole motivation set in the Office Action for combining the applied references, (i.e. replacing Matsunaga's outermost layers 20 and 14 with adhesive/primer layers 18 and 20 of Tomaru), is that such a substitution would have allegedly been obvious in view of the good thermal conductivity and heat-dissipation characteristics of silicone recited in Column 1, lines 63 – 67 of Tomaru". And further Applicant continues, "the disclosure of Matsunaga expressly contradicts this alleged motivation to combine these references. Specifically, Matsunaga expressly states that it is desirable that the outermost layers 14 and 20 "have excellent thermal resistance" (see Matsunaga, col. 4, lines 16 – 18), which is the opposite of good thermal conductivity (emphasis added).

Examiner disagrees with this notion due to the following reasons.

1. "The excellent thermal resistance" of Matsunaga does not stand for poor thermal conductance, as Applicant alleged. Matsunaga uses the term "thermal resistance" as an indicator of maximum temperature the material can withstand. It is apparent from the following statement, "insulating film layer 16 is preferably an insulating film having a thermal resistance of 150^0 C or greater" (col. 6, lines 6 – 11). It is well known in the art that the thermal resistance is not measured in degrees of Celcius. According to the D. Steinberg textbook, Cooling Techniques for Electronic Equipment, the thermal conductivity is measured as a ratio of amount of heat (calories) per time units (seconds), units of length (centimeters) and temperature (degrees of Celsius). The reciprocal to the thermal conductance by no means is measured in degrees of Celsius alone. Therefore, the "excellent thermal resistance" of Matsunaga has nothing to do with the poor thermal conductivity.

2. Additional evidence for that is that Matsunaga further provides the list of materials having so called "excellent thermal resistance" (col. 6, lines 10 – 18). One of them is Kapton (manufactured by Toray-DuPont), which is well known in the art, as material widely used in electronics, particularly for the heat removal, due to its excellent thermal conductivity.

3. The Applicant's allegation of Matsunaga's intention to use materials with poor thermal conductivity is contradicted by the following Matsunaga statement: "It is by the way, desirable that such devices as these have a high coefficient of thermal conductivity". And further "When coefficient of thermal conductivity is low, the efficacy of

the temperature adjusting means is insufficient, causing the wafer to experience an abnormal increase in temperature during process" (col. 1, lines 37 – 51).

Therefore, the Applicant's inference that "Matsunaga expressly states that the layers 20 and 14,and particularly 14, are thermally resistant layers" (page 4, lines 1 – 2) is wrong.

Therefore, it is quite clear that Matsunaga uses the term "thermal resistance" to indicate the material ability to withstand the high temperature and not as a reciprocal to the thermal conductivity, as Applicant alleges.

There is no contradiction between Matsunaga reference seeking to increase as much as possible the thermal conductivity of the chuck device and Tomaru reference introducing the silicone bonding layer.

And finally, Applicant brings the argument (page 4, lines 11 – 15) that the Tomaru reference teaches use of the silicone in the second insulating layer, while Matsunaga teaches an adhesive layer interposed between a ceramic and a metal. In response to this argument, it has been held that one cannot show non-obviousness by attacking references individually where, as here, the rejections are based on combinations of references. *In re Keller,* 208 USPQ 871 (CCPA 1981).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeev Kitov whose current telephone number is (571) 272 - 2052. The examiner can normally be reached on 8:00 – 4:30. If attempts to reach

examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272 – 2800, Ext. 36. The fax phone number for organization where this application or proceedings is assigned is (703) 872-9306 for all communications.

Z.K.
X/Y/Z